

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) An engine valve assembly, comprising:

a valve seat;

an engine valve element adapted to move relative to the valve seat between an open position and a closed position;

a mechanically driven actuator being adapted to move the valve element to the open position;

a fluidically driven actuator being adapted to prevent the valve element from moving to the closed position, the fluidically driven actuator including an actuator piston reciprocatingly disposed in an actuator cylinder, the actuator piston adapted to maintain the engine valve element in an intermediate position between the closed position and the open position, the actuator cylinder being in fluid communication with a source of pressurized fluid, the source of pressurized fluid being insufficient to move the valve element toward the open position ~~in an internal combustion engine~~; and

a control valve adapted to pass the flow of the pressurized fluid to the actuator cylinder during movement of the valve element toward the open position, and maintain the fluid in the actuator cylinder during movement of the valve element toward the closed position to maintain the valve at the intermediate position.

2. (Original) The engine valve assembly of claim 1, including a spring connected to the engine valve element and biasing the engine valve element toward the closed position.

3. (Original) An engine valve assembly, comprising:
an engine valve element disposed in a port connected to an engine cylinder;
a fluidically driven valve actuator;
a source of low pressure fluid in fluid communication with the valve actuator, a force generated by the source of low pressure fluid being sufficient to move the valve element and take up lash associated with the valve element and the valve actuator;
an engine driven mechanical linkage mounted proximate the engine valve element and adapted to move the engine valve element to an open position; and
a control valve adapted to control a flow of pressurized fluid from the source of low pressure fluid to the valve actuator.

4. (Original) The engine valve assembly of claim 3, wherein the valve actuator includes an actuator cylinder and an actuator plunger reciprocatingly disposed in the actuator cylinder.

5. (Original) The engine valve assembly of claim 3, wherein the valve actuator includes an actuator piston reciprocatingly disposed in an actuator cylinder, the actuator piston having a rod operatively associated therewith and being adapted to maintain the engine valve element in an intermediate position between a closed position and the open position.

6. (Original) The valve assembly of claim 3, including a coil spring mounted about the valve element to bias the valve element toward a closed position.

7. (Original) The valve assembly of claim 3, wherein the source of low pressure fluid is a lubrication oil system of the engine.

8. (Original) The valve assembly of claim 3, wherein the mechanical linkage is actuated by a cam shaft.

9. (Original) A variable valve actuator system, comprising:
a valve positioned adjacent an engine cylinder;
an engine driven mechanical actuator system adapted to move the valve between first and second positions;
a fluid pressurization source;
a fluidically driven valve actuator in predetermined intermittent fluid communication with the fluid pressurization source, the fluidically driven actuator adapted to prevent the valve from moving to the second position for a predetermined period of time;
a control valve adapted to shut off fluid communication between the fluid pressurization source and the fluidically driven valve actuator and to prevent fluid from back flowing out of the fluidically driven actuator causing the fluidically driven actuator to become hydraulically locked.

10. (Original) The variable valve actuator system of claim 9, wherein the source of pressurized fluid is a lubrication system for an engine.

11. (Original) The variable valve actuator system of claim 9, wherein the mechanical actuation system includes a cam shaft to move the valve from the first position to the second position; and

a compression spring to move the valve from the second position to the first position when the fluidically driven actuator is not hydraulically locked.

12. (Original) A method of controlling an engine having at least one valve, comprising:

moving the valve from a first position to a second position with a mechanically driven actuator;

moving the valve from the second position to an intermediate position between the first and second positions; and

holding the valve in the intermediate position with a fluidically driven actuator in a hydraulically locked configuration.

13. (Original) The method of claim 12, wherein holding the valve in the intermediate position comprises:

transporting pressurized fluid from a fluid pressurization source to the fluidically driven actuator;

removing fluid communication between the fluid source and the fluidically driven actuator; and

hydraulically locking the fluid in the fluidically driven actuator by preventing fluid backflow from the fluidically driven actuator.

14. (Original) The method of claim 12, wherein preventing backflow is performed by a control valve.

15. (Original) The method of claim 12, including holding an intake valve in the intermediate position with the hydraulically locked actuator.

16. (Original) The method of claim 12, including holding an exhaust valve in the intermediate position with the hydraulically locked actuator.

17. (Original) The method of claim 12, wherein moving the valve from the first position to the second position includes using a mechanical linkage.

18. (Original) The method of claim 12, wherein moving the valve from the first position to the second position includes the step of using a mechanical linkage having a cam.

19. (Currently Amended) The method of claim 12, wherein holding the valve in the intermediate position includes using a hydraulically locked actuator having an actuator cylinder and an actuator piston reciprocatingly disposed in the actuator cylinder, and wherein holding the valve in the ~~open~~ intermediate position includes directing fluid to the actuator cylinder and preventing backflow of the fluid out of the actuator cylinder.

20. (Original) The method of claim 12, wherein the pressurized fluid is lubrication oil of the engine.

21. (New) An engine valve assembly, comprising:

a valve seat;

an engine valve element adapted to move relative to the valve seat so as to open and close an air intake port of the engine;

a mechanically driven actuator being adapted to open the valve element;

a fluidically driven actuator including an actuator piston reciprocatingly disposed in an actuator cylinder, the actuator piston adapted to prevent the valve element from closing and being in fluid communication with a source of pressurized fluid, the source of pressurized fluid being insufficient to move the valve element so as to open the air intake port; and

a control valve adapted to apply pressurized fluid to the actuator cylinder to operatively engage the actuator piston with the valve element, thereby preventing the valve element from closing the air intake port, and to maintain the fluid in the actuator cylinder to maintain the engagement.

22. (New) A variable valve actuator system, comprising:

a valve positioned adjacent an engine cylinder;

an engine driven mechanical actuator system adapted to open the valve;

a source of pressurized fluid;

a fluidically driven valve actuator in intermittent fluid communication with the source of pressurized fluid, the fluidically driven actuator adapted to prevent the valve from closing for a predetermined period of time; and

a control valve adapted to shut off fluid communication between the source of pressurized fluid and the fluidically driven valve actuator, thereby causing the fluidically driven actuator to become hydraulically locked.

23. (New) The variable valve actuator system of claim 22, wherein the source of pressurized fluid is a lubrication system for an engine.

24. (New) The variable valve actuator system of claim 22, wherein the mechanical actuator system includes a cam configured to open the valve, and a compression spring to close the valve.

25. (New) A method of controlling an engine having at least one valve, comprising:

opening the valve with a mechanically driven actuator;

moving the valve toward an intermediate position; and

holding the valve open in the intermediate position with a fluidically driven actuator in a hydraulically locked configuration, wherein holding the valve open includes:

transporting pressurized fluid from a source of pressurized fluid to the fluidically driven actuator, and

removing fluid communication between the source of pressurized fluid and the fluidically driven actuator to hydraulically lock the fluid in the fluidically driven actuator.

26. (New) The method of claim 25, wherein opening the valve includes using a mechanical linkage including a cam.

27. (New) The method of claim 25, wherein holding the valve open includes using a hydraulically locked actuator having an actuator cylinder and an actuator piston reciprocatingly disposed in the actuator cylinder.

28. (New) The method of claim 25, wherein the pressurized fluid is lubrication oil of the engine.

29. (New) A method of controlling an engine having at least one exhaust valve, comprising:

opening the exhaust valve during an exhaust stroke of the engine with a mechanically driven actuator; and

holding the exhaust valve open during at least a portion of an intake stroke of the engine with a fluidically driven actuator in a hydraulically locked configuration to allow a portion of exhaust gas of the engine to be reintroduced to the cylinder.

30. (New) The method of claim 29, wherein holding the exhaust valve open includes:

transporting pressurized fluid from a source of pressurized fluid to the fluidically driven actuator to engage the exhaust valve after the exhaust valve has been opened; and

removing fluid communication between the source of pressurized fluid and the fluidically driven actuator to hydraulically lock the fluidically driven actuator in engagement with the exhaust valve.

31. (New) The method of claim 30, wherein the fluidically driven actuator includes an actuator cylinder and an actuator piston reciprocatingly disposed in the actuator cylinder.

32. (New) The method of claim 29, wherein opening the exhaust valve includes using a mechanical linkage having a cam.

33. (New) The method of claim 30, wherein the pressurized fluid is lubrication oil of the engine.

34. (New) The method of claim 30, further including restoring fluid communication between the source of pressurized fluid and the fluidically driven actuator to disengage the fluidically driven actuator with the exhaust valve, thereby allowing the exhaust valve to close.

35. (New) A method of controlling an engine having at least one intake valve, comprising:

opening the intake valve during an intake stroke of the engine with a mechanically driven actuator; and

holding the intake valve open during at least a portion of a compression stroke of the engine with a fluidically driven actuator in a hydraulically locked configuration to reduce a compression ratio of the engine.

36. (New) The method of claim 35, wherein holding the intake valve open includes:

transporting pressurized fluid from a source of pressurized fluid to the fluidically driven actuator to engage the intake valve after the intake valve has been opened; and

removing fluid communication between the source of pressurized fluid and the fluidically driven actuator to hydraulically lock the fluidically driven actuator in engagement with the intake valve.

37. (New) The method of claim 36, wherein the fluidically driven actuator includes an actuator cylinder and an actuator piston reciprocatingly disposed in the actuator cylinder.

38. (New) The method of claim 35, wherein opening the intake valve includes using a mechanical linkage having a cam.

39. (New) The method of claim 36, wherein the pressurized fluid is lubrication oil of the engine.

40. (New) The method of claim 36, further including restoring fluid communication between the source of pressurized fluid and the fluidically driven actuator to disengage the fluidically driven actuator with the intake valve, thereby allowing the intake valve to close.